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Reducing gender stereotypes through a digital positive youth development game

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Abstract: The purpose of this paper is to describe a newly developed digital positive youth development (PYD) game and discuss its effectiveness in understanding and reducing gender stereotypes and biases among junior secondary school students. The game, “male and female dichotomy”, allows students to explore gender stereotypes on “appearance”, “behavior”, “occupation”, and “traits” (ABOT) based on Deaux and Lewis’ gender stereotyping model. The design of the game is described after a review of relevant literature. The game guides students to examine the social demands and expectations of men and women in today’s world, and it enables them to reflect on how gender norms and their perceived gender stereotypes affect their perception on both genders. The game has been piloted in secondary schools in Hong Kong and is available free of charge upon request for non-commercial purposes. Two users who study in Shanghai and the United States were invited to review the game. Initial findings revealed that the section on “occupation” and “traits” were beneficial in the learning process, and the users became more aware of their gender biases. More research is needed to investigate the effectiveness of electronic game-based learning (GBL) in reducing gender stereotypes and biases among children and early adolescents.

Keywords: Prevention, positive youth development, digital game based-learning, gender stereotype, gender bias

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Introduction

The problem of gender bias is global. Gender bias affects people in academics, career choices, and mixed-gender relationship, and to certain extent personalities. According to ISSP Research group, women from more than 20 countries have reported issues of family posing a challenge for their careers and women reported higher level of family interference with work than men (1,2). The formation of gender identity starts at an early age. A study in Hong Kong suggested that boys prefer masculine toys while girls prefer feminine ones. Thus, this in turn shapes children into certain personalities in that girls are found to be more empathic and less aggressive (3). Furthermore, the awareness of a person's gender can harm his/her relationship with the opposite sex. Single-sex schooling is practiced in some schools. Wong, Shi, and Chen (4) suggested that single-sex school students are more prone to having mixed-gender anxiety and less mixed-sex friendship. As gender bias is a global issue, it is crucial to investigate into this problem in search of prevention and intervention plans.

Literature review

Gender stereotype is defined as the social standard perception on how male and female should think and behave in different situations (5). Traditionally, men and women were assumed to be responsible for particular roles, appropriate behaviors and duties in society. The social-political-economic-cultural opportunities for women in most cultures have been restricted, even though the situation has been improved noticeably nowadays in some economically advanced societies (6). Furthermore, sometimes women are highly involved in the labor market. At the same time, they are still very often the major carer at home in most societies. Yet, the dual role of women has led to conflicts and concerns (7). Caring for children and doing the household chores are tasks usually taken up by working women. The notion of gender role difference, the practice of dual role, and the societal norms may have reinforced the stereotypical concept and the dual role. More importantly, this stereotype is found in children and adolescents in one way or another.

Gender differences in activities and games

A study in Australia reported that teenage boys prefer spending time in physical activities or video games, whereas teenage girls rather spend their time on social activities, studying and household chores (8). In fact, gender role learning starts in an early age, and this process continues in children development (9). Children can differentiate gender differences by 18 months old through their ability in associating gender stereotyped toys (girls with dolls and boys with toy truck) (10). By the end of childhood, those who have stronger gender identity reported to have pressure to conform to their gender role (11). To behave according to the gender identity becomes a norm.

The formation of gender stereotype

The development of gender stereotype involves children's interpretation of the information in their surrounding sociocultural environment. Based on this process, they form a representation of gender called "gender schema" (12). A schema is a cognitive structure that guides an individual's perception through an association network (13). The gender schema theory proposed that gender schema contributes to sex typing by individuals due to the readiness of processing information based on the sex-linked associations (13). Ultimately, sex typing turns into a standard guide for one's perception and behavior, which also influences the concept of self-identity (12). Self-identity is inseparable with gender as identity is the adoption of specific traits or groups (14). By identifying self with female or male, this identity becomes part of the self that increases the motivation to behave similarly to the

identified group, attention to information of their own sex, and increases one's own interests in the activities that belong to one's own sex group (15).

The formation of gender stereotype is complex and often derives from sociocultural environment and cognitive development. According to social learning theory, people learn from observing others' behaviors and their consequences to avoid negative outcomes and gain benefits (16). Leaper and Farkas (12) suggested that the development of gender identity involves four distinguished processes including the 1) social-structural process, 2) social-interactive process, 3) cognitive-motivational processes and 4) biological process. The social-structural process is the perspective on gender roles in society; the social-interactive process refers to the experience children interacting with others such as parents and peers; the cognitive-motivational process helps shape children's perception and interpretation on the world, usually related to self-esteem and self-identification; and finally, the biological process that children recognize from the physical differences with their opposite sex.

Media influence

As part of socialization agents, mass media shape gender stereotype as they are the major source for children and adolescents to acquire enormous amount of gender information. Even products for preschoolers are embedded with gender specific messages such as bedsheets, furniture, toys and clothes (17). The marketing of products for young children is also specific to gender, creating a differentiation between boys and girls (18). Young children utilize the information they learn from popular culture and media to shape the way they dress, talk and play (19). For example, media has been portraying female as a subordinate figure such as associating women with housewives and homemakers (20) and promoting a specific body shape (21). With the constant exposure of these in-balanced or even biased information, adolescents form their perception in gender.

Parental influence

Parents and significant others play a crucial role in the development of gender stereotype. Parents influence their child's perception on gender identity when they reinforce or discourage certain behavior in play (18). For instance, fathers react negatively to their children's cross-gendered behavior, particularly with their sons (22). From that, children develop their gender identity on how they should behave according to their genders. Parents' contribution to their children's gender stereotype continue to the adolescence period (23). A study showed that parents' distorted perception on their children's ability and interest based on gender stereotype affect children's performance in gender-role stereotypical activities such as sports and mathematics (24).

Peer influence

Peer influence is powerful in adolescent development (25). According to social identity theory, people naturally seek positive identification with social groups (26). Adolescents learn to avoid behaviors that are inconsistent with their social group. Friends contribute to gender stereotype via peer pressure on how they interact with their friends. Children are aware of the cross-gender behavior. For example, boys find their peers who display feminine behaviors and qualities less acceptable (27). Boiché and colleagues (28) have proven that adolescents' sports performance, especially in girls, depends on their social environment. Moreover, if girls perceive sports-gender stereotype in their social environment, they are likely to drop out from physical activities.

To conclude, young children start to form their gender stereotypes while they are actively searching for gender cues in their environment (15). Young children demonstrate

their gender stereotypical behavior through play (18). For example, girls are likely to select family roles while boys prefer action-oriented roles in dramatic play (29).

Effects of gender stereotype

During adolescence, effects of gender stereotype extend to appearance, behavior and personality traits. Young boys and girls have a certain perception on how men and women should look like. One interesting finding is that both boys and girls hold a perception bias in women body size, underestimating the average body size of women with a slim-female thin ideal (30). Such a perception is encouraged through advertisement in mass media promoting slim females, resulting in a decrease in body satisfaction and self-esteem in young girls (21). In terms of behavior, young males are associated with verbal and physical aggression (31), a tendency to be engaged in risky behaviors (32), and a tendency to risk driving as the characteristic of risk-taking is associated with masculinity (33). Moreover, girls show a less-risk taking and more self-less characteristic compared to boys (6). Females are also perceived to score higher in certain personality traits such as openness, conscientiousness, and agreeableness (34), while males are associated with instrumental traits including aggressiveness and competitiveness (35).

Consequences

Gender stereotyping does not only affect adolescent academic performance but also in physical activities and occupational choices. Numerous studies confirmed its effect on academic performance, in particular, mathematics. Research showed that adolescent girls are less likely to participate in a mathematic task under competition circumstances, while no gender difference is observed in verbal tasks (6). In addition, it is found that girls perceive themselves to have better literacy ability, while they rated the boys lower in literacy (36). Girls also feel less comfort and sense of belonging with computer science due to the negative stereotypical concerns (37). In terms of physical health, a study showed that adolescents are likely to hold stronger sports gender stereotype if they perceive their social environment to do so (28). Additionally, personal endorsement of stereotypes can lead to dropout behavior when adolescents' perceived gender plays a significant role in the success of playing certain type of sports (28). In fact, boys adopt such a stereotype. They are more likely to participate in invasion game and reported invasive ball games to be enjoyable, while girls prefer to be a bystander and take an observer role, demonstrating gender differences in physical education (38). Exercise is beneficial to young people's cognitive development (39) and reduces depressive symptoms (40). With girls being less physically active due to the stereotypical effect, it could adversely affect their mental health.

While occupation aspiration will develop in children at an early age (41), early gender bias in occupational choice has been observed in boys that they tend to pursue traditionally male career (42). Adolescent boys usually have a science and mathematics career aspiration, especially if their male peers also hold the same career aspiration (43). When asking both young boys and girls about their expectations on future occupation, young girls reported to value helping people, whereas boys preferred science related jobs and valued variables such as becoming famous, earning lots of money and controlling others (44). Interestingly, female adolescents exhibit struggles between their commitment of their future family and their future careers. Their career aspiration is also associated with their mother's occupation (45) and they tend to select a career that matches with their gender role (44).

Apart from affecting academic performance, limiting the choices of physical activities and occupation, gender stereotyping could have more severe consequences such as peer victimization which include physical, verbal, and relational aggression (46), social exclusion, and social isolation (47) for both genders. They can lead to devastating outcome if a child

was isolated or excluded from his/her social group because of exhibiting behaviors deviated from the gender norms. Interestingly, there has been few research which specifically examines the impact of gender stereotyping that focuses on how children think about the issue - what they understand about gender stereotyping and the consequences that bring forth by it (48).

Deaux and Lewis (1) identified a gender stereotyping model with four components to explain how people differentiate male from female, including physical appearance, traits, behaviors, and occupations. The model posits that information about physical features seems to be in the central position which strongly affects judgments about the other three components whereas the other three components affect one another mutually. Moreover, stereotyping is a cognitive process which is a necessary antecedent for a negative evaluation of any individuals or groups. As an attitude, prejudice is a necessary condition for discrimination behaviors.

Prevention strategies

Andreoletti, Leszczyński and Disch's (49) study on compound stereotypes (gender, race, age) suggested that gender stereotypes about agency and communion tend to remain across the life span and that people usually hold a unique stereotypical belief based on multiple social categories. For prevention, work should start as early as possible. Children's potentials and development are limited by gender stereotype and sexism (18).

Awareness and reflection

To facilitate positive development in adolescents, it is important for adolescents to recognize and to be aware of gender stereotype in order to reflect on their own perception and behavior.

Role-model and workshops

One possible way is to provide a role model that overcomes gender-stereotype barriers (50). Alternatively, educational workshops on gender stereotypes with teacher participation are found to be effective to facilitate students to make less gender bias decisions and behavior (51). Given that, we expect teacher's involvement in the learning process as a moderator and guidance.

Classification and game-based learning

Classification training has been shown in research to be helpful to resist gender stereotype information in young people (52). The newly developed game adopts this idea with a final product of classification game highlighting the gender stereotype perception. We aim to help players identify gender stereotypes in order to reduce them.

Video games have been proved to have educational value, especially in this modern age where computer and video games thrive (53). Students are more engaging when they learn from playing video games (54). However, Weber and Custer's study (55) suggested that digital game-based learning (DGBL) might be more suitable for middle school students compared to high school students partly because middle school students showed a keen interest in contemporary technological learning activities and they may have less been exposed to such learning experiences. Thus, this supports why the digital games are specifically designed for middle school age students who start to develop their gender identity at this stage of their development with an aim to minimize the effect of gender stereotype.

Design of the game

It is inevitable that we experienced certain degree of social indoctrinations such as different views on women and men, and their respective demands and expectations from society when we grow up. In modern societies, many traditional gender roles or images have changed. For example, the number of husbands taking care of household chores has been increasing. Can we maintain an open attitude? Respect and acceptance are important elements regarding gender issues. Students may have already had their unique opinion on both genders growing up in their family, community and social environment. They might have a set of criteria regarding gender roles, which have been deep-rooted in their minds. To intervene, the game enables students to explore gender stereotypes on “appearance”, “behavior”, “occupation” and “traits” (ABOT). The aim is to examine the perception of gender stereotypes in contemporary society. It guides students to examine the social demands and expectations of men and women in today’s world. It enables them to reflect on those perceived gender stereotypes, and how they affect their personal perceptions on both genders.

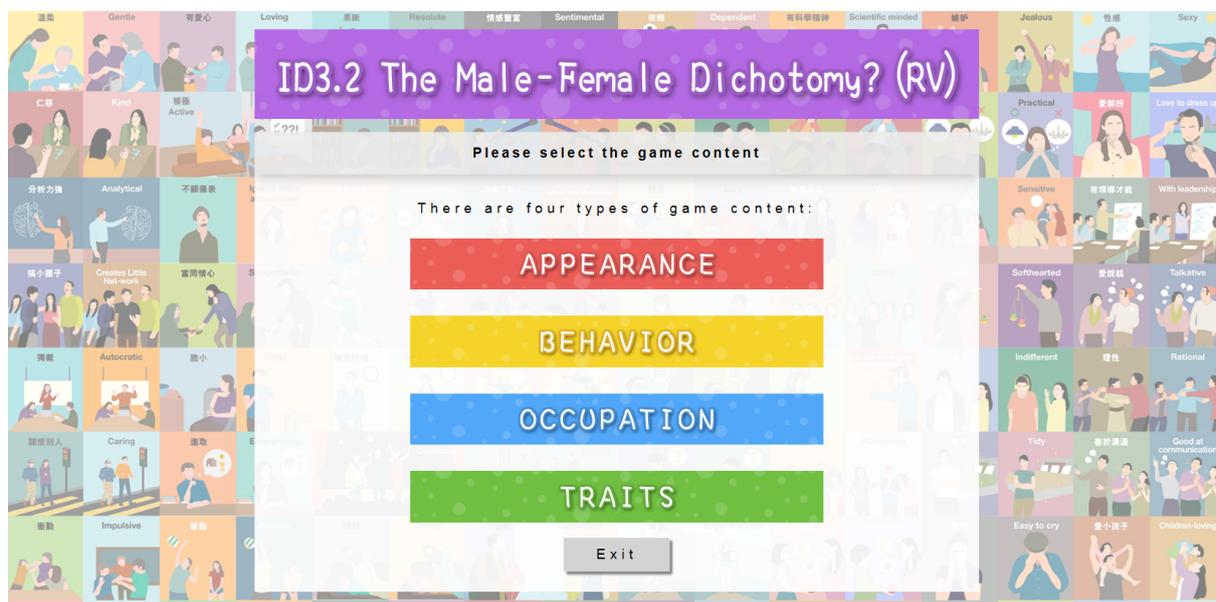


Figure 1. The front page of the game

This game targets participants of Secondary 3 level, the equivalent of Grade 8 in North America. There are four sections of the game to choose from, and instructors can choose selectively according to the needs of the students. Games range from 15-minute long to about half an hour.

Game objectives

The objectives of this game can be separated into three different aspects: cognitive, emotional, and behavioral. On the “cognitive” aspect, students can develop a deeper understanding of their own gender stereotypes and biases in ABOT. On the “emotional” aspect, students can enhance their acceptance of the opposite gender in the four areas. On the “behavioral” aspect, students can reduce discrimination against people with a distinctive gender profile, and get along harmoniously with the opposite gender as a result of an increased acceptance level.

The games are designed for students to understand gender stereotypes as well as their views and values on gender roles. Besides, students can learn and understand how stereotyping affects career decisions and reflect on the importance of gender equality.

Teaching and learning method

Through the use of gender stereotype awareness games, feedback and guidance are provided for students according to their responses to help them reduce gender stereotypes and biases. Besides, instructors can make use of the supplementary teaching materials and encourage small group and class discussion on the topic of gender. Ideas of “Male Superiority, Female Inferiority” and “Men Focus on the Outside World, Women Focus on the Home” and their respective impacts on our society can be used for discussion to help students understand the traditional views on the two genders, and the reasons behind those thoughts. Through the exploration of the differences in social status, values and responsibilities between men and women, we can invite students to share their thoughts and opinions, and instructors would get a sense of how students perceive gender and its respective role.

Learning effectiveness can be enhanced through discussions among mixed-gender groups. Specifically, such discussions provide an opportunity for students to clarify their own values about gender norms. Through discussing with an open mind, where students can face each other as equals, students can learn to respect different views while reflecting on their own values.

Game design

Students are required to answer questions to indicate their acceptance of different gender images. All questions are presented together with graphics. The whole game is composed of four sections. The first two games test students’ gender stereotypes and biases in “appearance” and “behavior” by their acceptance levels. Students are invited to ponder if appearance affects their attitude and perception of others, i.e., their preferences regarding making friends with people of particular features or style such as an untidy person, a fat or thin person, a girl with short hair; and if they accept them, to what extent they want to be associated with them such as becoming their spouse or good friends.

The Guttman scale (56) is used in measuring the attitude of each user in the first two games on appearance and behavior. Users are given an artwork which shows a certain appearance or behavior. They are asked whether they accept it from a list of 7 people who have varied levels of relationships. These 7 choices are arranged in a hierarchical order: the future spouse, a family member, a good friend, a friend, an acquaintance, an on-line-follower, and unacceptable. If a respondent can accept a certain appearance or behavior from his/her future spouse, it can be inferred that this respondent will accept all other people who have the same appearance or behavior. This reflects that the respondent has the highest acceptance level. At the end of each of these two games, a quantitative analysis on the acceptance level of the player will be presented. Instructors can encourage students to discuss two questions: Is people’s appearance or behavior a factor to consider before students form a certain relationship with a person? What level of relationship will students be willing to have with someone who shows unconventional appearance or behavior, for example, a man who cooks or learns ballet?

In the last two games, students are invited to indicate whether an “occupation” or a “trait” is gender-neutral to test their gender stereotypes. In the game on occupation, students need to think if certain occupations are generally more suitable for females, males or both in the contemporary society. They might conform to social norms and traditional gender roles, and thus form an impression that particular occupations should be held by a particular gender but not both. For the game on trait, students are asked to determine if the features are suitable to describe a particular gender or both. This will test how they perceive the differences in personality traits between the two genders.

After they finish one of these two games, a qualitative analysis based on students’ choices will be provided in terms of gender stereotypes. For the game on occupation, instructors can make use of that opportunity to discuss with students that choices of career are

influenced by many aspects such as income, social status, social expectations and significant others, and that gender-specific traits are stereotypes. For the game on trait, students will have opportunities to review their degree of tolerance and acceptance of others as well as the level of respect for others and tendency towards gender stereotyping. Instructors can encourage students to reflect how they describe females, males or both genders, whether they have gender biases, and whether there are gender-specific traits.

The qualitative analysis presents the views and beliefs of students, which to a large extent are influenced by social requirements and views and expectations. To promote further discussion, instructors may suggest students to use the print-screen function to print out the analysis as the game does not record any data once the player exits the game. Suggestions can be given to encourage students to be more courageous and open-minded about the choice of career and views on gender-specific traits. Constructive suggestions might be given to encourage students to adopt a more open-minded approach to human diversity and equality. They are encouraged to reflect on the reasons why they believe certain occupations/traits are more suitable for a specific gender.

Tips for instructors

Instructors may demonstrate the game in a class or an assembly and remind students to have an open mind when reading the feedback provided by the game. The feedback and guidance help students reflect on the issues of gender biases, look in depth into these issues through discussions in or outside of the class, and try to summarize the different views. Instructors may encourage students to re-play the game so that they can observe any changes in their acceptance level of different gender images after discussion. As our impression and perception of women and men are largely influenced by our socialization through life experiences and interactions with others in our circle, instructors may encourage students to try to see how our society projects the images of gender and how it treats the two different genders. Moreover, our stereotypes and biases on ABOT are reinforced through our social interactions and expectations. We have to help those who might be confused, feel uncomfortable or unable to accept. Instructors may encourage students to try to see gender disparity in a different way - the bottom line is to treat one another with respect and tolerance.

In terms of occupations, instructors can remind students to be respectful and tolerant of others in terms of career choices based on one's interests, abilities, and adaptive development. Students can explore the possibilities of certain occupations, which traditionally are dominated by one gender, from a different angle. Will they accept themselves to take up the work which is normally performed by an opposite gender such as a male nurse and a female electrician?

Instructors can bring in their personal experiences and other real life examples to broaden student's thinking on the issue. Discussions between female and male students should be encouraged to help students understand what the other gender think or experience in their daily life. In cases such as single gender school, instructors can encourage students to use the teaching material after class and discuss with their family members. Social workers or counsellors can use the teaching material for individual or group counselling.

Positive youth development constructs

The game was specially designed to contribute to one of the 15 positive youth development (PYD) constructs, i.e., "Clear and positive identity". They have been identified as effective components of PYD programs (57). Incorporating all the 15 constructs, the project P.A.T.H.S. is an evidence-based and multi years universal PYD program (58,59). The objectives of the project are to promote a holistic development of adolescents in Hong Kong by providing opportunities and recognition to develop competence and skills which are conducive to PYD.

The program aims at promoting bonding and resilience among adolescents, enhancing core competencies, training critical thinking skills, and cultivating healthy beliefs and values. The project provides a primary prevention program through 20 hours in Secondary 1 to 3 (Grades 7-9). A total of 120 teaching units (each 30 minutes) covering 15 PYD constructs. It also provides a tier-two program to meet the needs of students with greater psycho-social needs. Evaluation studies showed that the project was efficacious in addressing psycho-social risk factors during adolescence (58). In an effort to revamp the content by adding a DPYD game, a new curriculum unit was designed. It can be used independently or to support two existing teaching units. A brief description of these two related units is provided below.

Related teaching units: Concept maps, learning targets, and teaching tips

The two related teaching units are named SX2.2 “Men...Women...Not” and SX2.3 “You Can’ be Good at this”. They were designed to promote sex education for S2 (Grade 8). For SX2.2, the learning targets are to understand gender stereotypes and understand students’ views and values on the gender roles. It focuses on the construct of “Prosocial Norms” and “Social Competence”. The concept map is presented in figure 2.

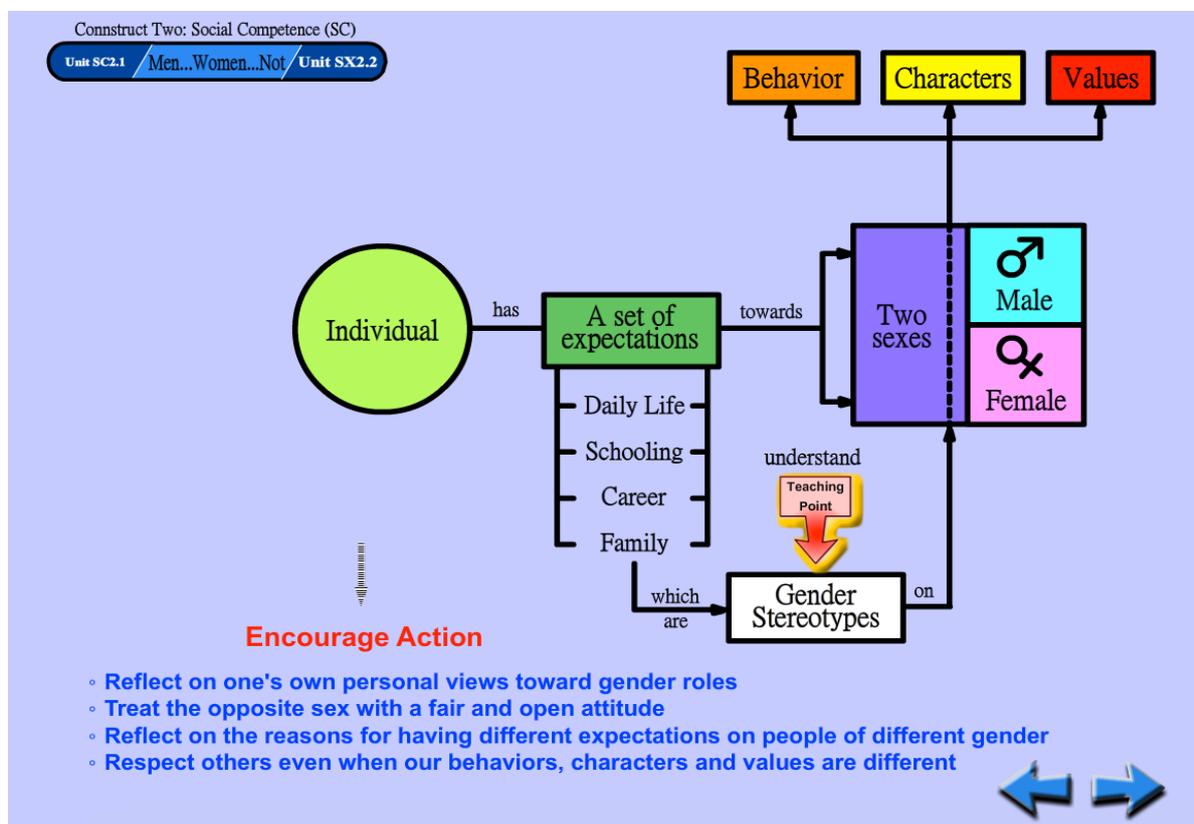


Figure 2. Concept map for teaching unit SX2.2

Teaching points for the teaching unit SX2.2

There are a set of expectations towards the two genders in our daily life, schooling, choice of career and family. It is often affected by gender stereotypes, and has direct impact on an individual from different people such as parents at home and teachers from schools. Those gender stereotypes on the two genders also have an impact on people’s behaviors, characters and values. Instructors should understand those gender stereotypes and share with students what they are and how they affect our perceptions of gender consciously and unconsciously.

In the teaching unit, students could reflect on one’s own personal views toward gender roles, and be encouraged to treat the opposite sex with a fair and open attitude.

Instructors can guide students to reflect on the reasons for having different expectations on people of different gender, and remind students to respect others even when our behaviors, character and values are different.

For SX2.3, the learning targets are to understand how stereotyping affects career decisions and help students to learn about the importance of gender equality. It focuses on the construct of “Self-determination” and “Moral Competence”.

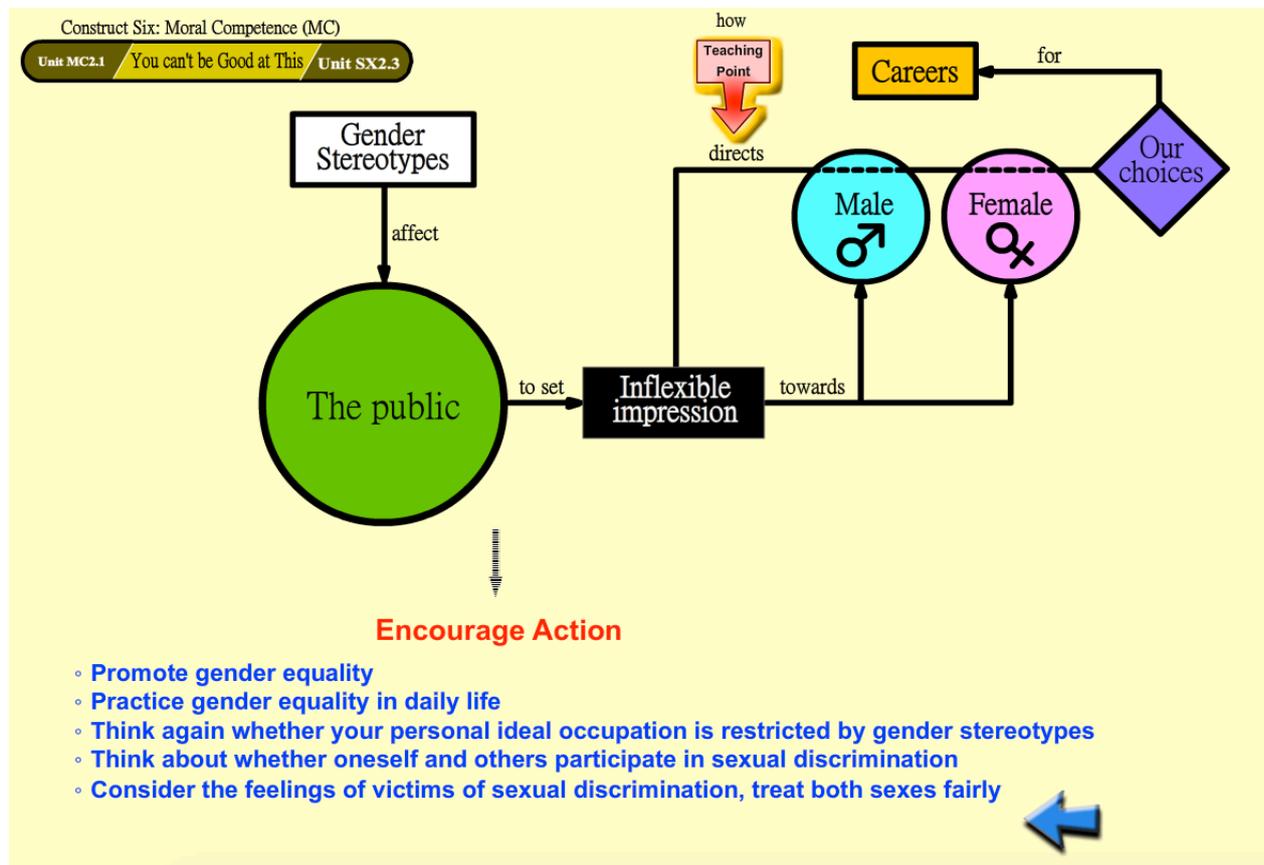


Figure 3. Concept map for teaching unit SX2.3

Teaching points for the teaching unit SX2.3

Gender stereotypes affect everyone in the public domain as our society often sets inflexible impression towards both male and female. Those impression and ideas directly affect our choices for careers and people might see certain careers exclusively for male or female without questioning the rationale behind. In the theory of planned behavior, it links one’s beliefs and behaviors. Our attitude toward others’ behaviors, the subjective norms, and perceived behavioral control, all combined to shape our behavioral intentions and behaviors (60). Instructors should discuss those impression and ideas with students, and listen and understand where students are coming from when they share their thoughts on the topic.

Instructors may make the best use of this unit to promote gender equality and suggest ways for students to practice gender equality in daily life. Encourage students to think thoroughly if their personal ideal occupation is restricted by gender stereotypes through class discussion. Besides, it is a good opportunity to help students reflect on whether they or others in the community have engaged in sexual discrimination behavior. If so, discuss some of the ways students can do to minimize that from happening again. We can increase students’ empathy towards the victims of sexual discrimination by inviting them to consider victims’ feelings so that they realize that they should treat both genders in a fair way.

Instructors can make use of the reference materials provided to supplement their teaching of this unit when using the game with students. The materials can be found in unit ID3.2 “The male-female dichotomy?” There are reflection questions available for instructors to use with students at the end of the teaching section.

In the game, students were given the opportunity to think how our attitude and perception toward someone are affected by his/her appearance which affects their relationship with others. They can reflect on their preference regarding making friends with a person with particular features or style i.e. a fat person, an untidy person, a very thin person or a girl with short hair, etc. Students can be invited to actively engage in self-reflection on their own personal values towards gender roles and how that affects their behaviors. Also, students are invited to think if certain occupations are generally more suitable for females, males or both currently in society.

To sum up, the games support the teaching units to help promote and practice gender equality, increase awareness of gender stereotypes, and cultivate empathy for victims of sexual discriminations among students.

Users’ feedback

To collect feedback from users, convenient samples of adolescents and young adults were invited to use the game. Participants were invited to reflect on their experiences and comment on the game design.

The following comments came from a 15-year old Chinese female student studying in an international school in Shanghai. Parental and participant’s consents were obtained to use the game and her comments on her experience.

Appearance

“For me personally, this exercise was not extremely eye-opening because I think that in my upbringing in an international school, I’ve been exposed to a range of students and friends from many different countries and with different physical appearances. Thus, my responses for most of the categories remained unchanged throughout the game.”

Behavior

“For the behavior game, I was entirely sure what the main learning aim was when playing. Based on my understanding, the game was set up in such a way that typical assumptions about girls and boys were provided, and I would pick what type of relationship I would be willing to be in. However, I think that one aspect that this game overlooks is the player’s personal values. For the traits that are stereotyped as non-feminine, such as “behaving violently with others” and “fights with others physically”, by clicking not acceptable does not necessarily mean that the player is against females specifically doing this, it may be that the behavior overall is something that people should not have. To account for players’ personal values, it may be useful to ask players to pick whether or not they would accept a relationship with a certain behavior for females and males separately. For example, “What relationships can you accept to form with a young lady who does not know how to cook?” and “What relationships can you accept to form with a young man who does not know how to cook?” could both be asked in the game.”

Occupation

“I found this game interesting because there were a lot of occupation options offered. It helped reinforced ideas supporting career gender equality, such as how males can also be home-carers, and females can be engineers or programmers. However, I felt like the game was a bit repetitive.

Towards the end of the game, it was easy to fall into the trap of just putting all the occupation blocks into the “both” category without thinking or reflecting on what my opinion really was.”

Traits

“Throughout the first run-through this game, I found that there were definitely some biases I held towards what traits are considered feminine or masculine. After playing the game, I think that I was more self-aware of these biases. Similar to the occupation game, I think that due to the repetitive nature of just placing traits into different categories, it was less effective in self-reflection towards the end of the game.”

A 19-year old college student from the United States wrote on one of the games “Behavior”:

“I do not think there is much that needs improvement here. It is fine as it is. I believe this section was well done. It conveys the message of breaking down stereotypes and being more accepting clearly to the player.”

Discussion

Different times impose different demands and expectations on either gender, which play a crucial role in maintaining social stability and harmony. As we grow up, the external world including families, schools, communities and societies instill into us identities of what men and women should be and what are expected of each gender. This teaching unit helps students examine in depth the positive and negative implications of these notions with regard to gender equality. The instructors can lead students to think of examples of heroes/heroines of all times from around the world and talk about their achievements. As a basic principle for human relationship in any modern society, individuality should be respected. Women and men develop their own distinct qualities such as physical appearance, physique and thought pattern through socialization since birth. On one hand we should treat one another with respect, acceptance and tolerance and on the other we must help keep this principle through primary prevention to provide early education, clarification of values, and treatment if necessary when it comes to the issues of gender inequality. Our society should strive to recognize and rectify inequality should gender prejudice and discrimination happen. Students should be reminded that people should not be limited by gender, and they are free to follow their passion and fulfil their dreams regardless of society’s perception of gender roles.

From the users’ feedbacks, it was suggested that the games successfully evoked adolescents to rethink about gender roles and their perception of gender. Particularly, the two users found the occupation and trait modules inspiring and interesting. They reported that the game in the occupation module helped to reinforce gender equality in occupation choice, especially in this modern society, man could be a home carer, whereas woman could work in the science and engineering industry. It seems that this game can help students understand the constraint by gender stereotypes and gender norms (61) and expand their options in their future career choices (62). For the trait module, it was reported to have similar effect with the occupational module. Users reported to be more self-aware of their gender biased traits, which they have formed unconsciously in the past. However, whether they will adopt a higher level of acceptance remains unknown. This calls for further research.

The feedbacks on the appearance and behavioral modules were not as positive as the occupation and trait modules. Users expressed that the appearance game did not offer a surprising experience because they were used to the diversity in people. One further explained that she had many opportunities in life encountering people from different countries with different physical appearances properly because she studied in an international school. Further studies are recommended to include players of different backgrounds. The

behavioral module was reported to be confusing that the user had difficulties understanding the learning purpose of the game. One user pointed out that the cause of his confusion could be design-related as it disregarded the personal value of the participants. This issue deserves further examination.

The initial findings from users' feedback were partially consistent with previous research that education on gender stereotype helps the young ones to be less gender biased (51). Participants suggested 2 out of the 4 modules of the game could be further improved in order to clearly deliver the game content to address gender stereotype. The qualitative comments were also supported by the study of Bigler and Liben (52) that classification trainings such as occupational sorting were crucial for counter-stereotypic information, potentially reducing gender stereotype in young people. In addition, utilizing computer games in the education context suggested by Squire (53) is supported in the current study. Junior secondary school students generally enjoyed learning through playing computer games, echoing the study by Weber and Custer (55) that early adolescents benefit from DGBL. This study provided a background for testing the effectiveness of the game.

To sum up, the use of GBL materials do have benefits over traditional teaching and learning format such as learning from textbooks. In this game, designers have considered the principles of attractiveness of the pictures and characters, the background of the screens, the engagement and responses of the participants in the activities and the feature of repeated use when putting the games together. With the help and guidance of the instructors and peer interactions, students were motivated to participate in the activities and learn in a fun and educational atmosphere on gender equity and stereotypes at the pace of the class and at home as well.

Limitations

A problem with the current study was the generalizability of its results. Compared to quantitative research studies, the findings of a qualitative study cannot be extended to the greater population as the data from a qualitative study are not examined to ascertain whether the findings are statistically significant or due to chance (63). The qualitative data should be interpreted with caution.

Testing the effectiveness

This study did not obtain any quantitative data on the level of gender stereotype of the middle school students. In the future, a thorough quantitative research can be conducted to test the effectiveness of the game in minimizing gender stereotype among adolescents. Many well-established scales have been developed to measure the level of stereotype including the Gender Role Attitude Scale (GRAS), the Bem Sex Role Inventory (BSRI), the Personal Endorsement of Gender Stereotypes Scale, and IAT (implicit association test). These measurements have been validated in Asian countries including Japan (64), Taiwan (65), and China (66). Adopting these measurements to examine gender stereotype would be suitable in future research. To test the effectiveness of the game, a pre-test and post-test design is recommended. Basically, the study could first examine the level of gender stereotype in secondary school students using the above measurements before introducing the electronic game. After students have completed their learning, the same set of questionnaires could be done by the same group of students in order to find out if there are changes in their level of gender stereotype by comparing the scores before and after introducing the materials. From that, the effectiveness of the materials could be concluded in our target group. It is also worth investigating whether the games could be utilized for children aged between 8 to 11 using the suggested design above as evidence has proven that children as young as aged 8 can develop gender stereotype in academic and occupation preference (67). Apart from examining the

gender stereotype, other factors that are affected by gender stereotype such as self-esteem, body shapes and subjective wellbeing could be explored in addition to the effectiveness of the games.

After testing the effectiveness of the study, future studies can focus on the impact of teacher involvement in maximizing the effect of the game. The role of teacher in educational activities that minimize gender stereotype has been confirmed in a study (51). Even though we have assumed the involvement of teachers in delivering the materials, future exploratory study could be conducted to examine the teaching and learning processes of our DPYD games. A cross-sectional study comparing the level of gender stereotype between the group of students with teacher as a guidance and the group of students without teacher involvement would be ideal. This could further inform the teaching and learning processes to maximize the effect.

Conclusions

The key finding is that the game seems to be beneficial for secondary school students in terms of enhancing their awareness and reducing the effect of gender stereotypes and biases. A few issues are raised in this study that required further research on the issue. Some adjustments are needed on the use of the game for different levels of prevention. The results suggested a need to conduct exploratory and quantitative studies to gain a better understanding of the effectiveness of the materials and its utilization among students.

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